* NOTICES *

Bibliography

---

(19) [Publication country] Japan Patent Office (JP)
(12) [Kind of official gazette] Open patent official report (A)
(11) [Publication No.] JP,11-295502,A
(43) [Date of Publication] October 29, Heisei 11 (1999)
(54) [Title of the Invention] Plastic lens
(51) [International Patent Classification (6th Edition)]

G02B 1/04
C08K 5/3475
C08L 75/04
C09K 3/00 104
G02B 7/02
13/14
G02C 7/02

[FI]

G02B 1/04
C08K 5/3475
C08L 75/04
C09K 3/00 104 C
G02B 7/02 B
13/14
G02C 7/02

[Request for Examination] Un-asking.
[The number of claims] 12
[Mode of Application] OL
[Number of Pages] 6
(21) [Application number] Japanese Patent Application No. 10-332921
(22) [Filing date] November 24, Heisei 10 (1998)
(31) [Application number of the priority] Japanese Patent Application No. 10-44382
(32) [Priority date] Taira 10 (1998) February 10
(33) [Country Declaring Priority] Japan (JP)
(71) [Applicant]
[Identification Number] 000000527
[Name] Asahi Optical Co., Ltd.
[Address] 2-36-9, Maeno-cho, Itabashi-ku, Tokyo
(72) [Inventor(s)]
[Name] Murata Naoki
[Address] 2-36-9, Maeno-cho, Itabashi-ku, Tokyo Inside of Asahi Optical Co., Ltd.
(74) [Attorney]
[Patent Attorney]

[Name] Masuda Tatsuya (besides one person)

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

Epitome

---

(57) [Abstract]
[Technical problem] There are not yellow-izing of the lens under the effect of an ultraviolet ray absorbent, change of a refractive index, etc., and the plastic lens with which the mechanical strength of a lens does not fall further is offered.
[Means for Solution] It is characterized by forming the plastic lens of this invention using the constituent for plastic lenses containing the resin ingredient which mainly contains a urethane resin ingredient, and the ultraviolet ray absorbent whose absorption maximum wavelength in a chloroform solution is 345nm or more. As for the addition of said ultraviolet ray absorbent, it is desirable that it is 0.02 - 2.0wt% to resin ingredient 100wt%.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The plastic lens characterized by being formed using the constituent for plastic lenses containing the resin ingredient which mainly contains a urethane resin ingredient, and the ultraviolet ray absorbent whose absorption maximum wavelength in a chloroform solution is 345nm or more.
[Claim 2] The plastic lens according to claim 1 whose addition of said ultraviolet ray absorbent to said resin ingredient 100wt% is 0.02 - 2.0wt%.
[Claim 3] Said ultraviolet ray absorbent 2-(3, 5-G t-butyl-2-hydroxyphenyl)-5-chlorobenzo triazole, 2-(3-t-butyl-5-methyl-2-hydroxyphenyl)-5-chlorobenzo triazole, The plastic lens according to claim 1 or 2 which is at least one sort chosen from the group which consists of 2-(3, 5-G t-amyl-2-hydroxyphenyl) benzotriazol and 2-(3, 5-G t-butyl-2-hydroxyphenyl)

benzotriazol.
[Claim 4] Said resin ingredient is a plastic lens according to claim 1 to 3 which is a thing containing a sulfhydryl group content compound.
[Claim 5] The plastic lens according to claim 4 said whose sulfhydryl group content compound is either at least among pentaerythritol tetrakis (3-mercaptopropionate), 4-mercaptomethyl -3, 6-dithio -1, and 8-octane dithiol.
[Claim 6] Said resin ingredient is a plastic lens containing an isocyanate radical content compound according to claim 1 to 5.
[Claim 7] The plastic lens according to claim 6 said whose isocyanate radical content compound is either at least among m-xylylene diisocyanate, 2, and 5(2 6)-bicyclo [2, 2, 1] heptane screw-(isocyanate methyl) norbornane diisocyanate methyls.
[Claim 8] Said constituent for plastic lenses is a plastic lens according to claim 1 to 7 containing 0.01-10 ppm of bluing agents.
[Claim 9] The plastic lens according to claim 1 to 8 whose spectral transmittance of 400nm in 2mm thickness is 10% or less.
[Claim 10] The plastic lens according to claim 1 to 9 whose spectral transmittance of 400nm in 2mm thickness is 5% or less.
[Claim 11] The plastic lens according to claim 1 to 10 whenever [in 2mm thickness / yellow / whose] (YI value) is 1.5 or less.
[Claim 12] Said plastic lens is a plastic lens according to claim 1 to 11 which is a lens for glasses.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to a plastic lens, especially the plastic lens which consists of urethane resin which has ultraviolet absorption ability.
[0002]
[Description of the Prior Art] a plastic lens is lightweight compared with a glass lens, cannot break easily, and can be dyed, and precision shaping is easy for it -- etc. -- it is spreading through optical lens products, such as a spectacle lens, a camera lens, a Fresnel lens, a lenticular lens, and prism, quickly from a point in recent years. Especially, optical strain of urethane resin are small, and since it is excellent in transparency or shock resistance, its safety is high, and it has been used as a lens for glasses etc.
[0003] Furthermore, ultraviolet absorption ability is given to such a plastic lens, and what protects an eye etc. from the failure by ultraviolet rays is proposed. However, in order to give ultraviolet absorption ability, what has ultraviolet absorption ability was used for the resin ingredient for lenses itself, and coating the front face of a plastic lens with an ultraviolet absorption layer was performed.

[0004] However, by these approaches, there was a problem of the mechanical strength of a lens falling by the complementary color agent added in order for a lens to yellow-ize, or for a refractive index to change and to adjust this yellow-ization by the color (yellow) of the resin ingredient for lenses, or the ultraviolet ray absorbent itself.
[0005]
[Problem(s) to be Solved by the Invention] The purpose of this invention does not have yellow-izing of the lens under the effect of an ultraviolet ray absorbent, change of a refractive index, etc., and is to offer the plastic lens to which the mechanical strength of a lens is not reduced further.
[0006]
[Means for Solving the Problem] Such a purpose is attained by this invention of following the (1) - (12).
[0007] (1) The plastic lens characterized by being formed using the constituent for plastic lenses containing the resin ingredient which mainly contains a urethane resin ingredient, and the ultraviolet ray absorbent whose absorption maximum wavelength in a chloroform solution is 345nm or more.
[0008] (2) A plastic lens given in the above (1) whose addition of said ultraviolet ray absorbent to said resin ingredient 100wt% is 0.02 - 2.0wt%.
[0009] Said ultraviolet ray absorbent (3) 2-(3, 5-G t-butyl-2-hydroxyphenyl)-5-chlorobenzo triazole, 2-(3-t-butyl-5-methyl-2-hydroxyphenyl)-5-chlorobenzo triazole, A plastic lens the above (1) which is at least one sort chosen from the group which consists of 2-(3, 5-G t-amyl-2-hydroxyphenyl) benzotriazol and 2-(3, 5-G t-butyl-2-hydroxyphenyl) benzotriazol, or given in (2).
[0010] (4) Said resin ingredient is a plastic lens the above (1) which is a thing containing a sulfhydryl group content compound thru/or given in either of (3).
[0011] (5) A plastic lens given in the above (4) said whose sulfhydryl group content compound is either at least among pentaerythritol tetrakis (3-mercaptopropionate), 4-mercaptomethyl -3, 6-dithio -1, and 8-octane dithiol.
[0012] (6) Said resin ingredient is a plastic lens the above (1) containing an isocyanate radical content compound thru/or given in either of (5).
[0013] (7) A plastic lens given in the above (6) said whose isocyanate radical content compound is either at least among m-xylylene diisocyanate, 2, and 5(2 6)-bicyclo [2, 2, 1] heptane screw-(isocyanate methyl) norbornane diisocyanate methyls.
[0014] (8) Said constituent for plastic lenses is a plastic lens the above (1) containing 0.01-10 ppm of bluing agents thru/or given in either of (7).
[0015] (9) The above (1) whose spectral transmittance of 400nm in 2mm thickness is 10% or less thru/or a plastic lens given in either of (8).
[0016] (10) The above (1) whose spectral transmittance of 400nm in 2mm thickness is 5% or less thru/or a plastic lens given in either of (9).
[0017] (11) The above (1) whenever [in 2mm thickness / yellow / whose] (YI value) is 1.5 or less thru/or a plastic lens given in either of (10).
[0018] (12) Said plastic lens is a plastic lens the above (1) which is a lens for glasses thru/or given in either of (11).
[0019]
[Embodiment of the Invention] Hereafter, the plastic lens of this invention is explained to a detail. The plastic lens of this invention is characterized by being formed using the constituent for plastic lenses containing the resin ingredient which mainly contains a urethane resin ingredient, and the ultraviolet ray absorbent whose absorption maximum wavelength in a chloroform solution is 345nm or more. Thereby, yellow-ization of the lens resulting from the color of the ultraviolet ray absorbent itself etc. can be controlled, giving ultraviolet absorption ability to a plastic lens.
[0020] The plastic lens of this invention consists of a resin ingredient which mainly contains a urethane resin ingredient. By using such an ingredient, especially in the application as an optical lens, the transparency required of a lens product, shock resistance, thermal resistance, and

chemical resistance are good, and are excellent in surface hardness and a mechanical strength, and can consider as the useful plastic lens equipped with the high refractive index.
[0021] What contains the isocyanate radical content compound which mainly serves as a raw material of urethane resin, and a sulfhydryl group content compound as a resin ingredient is desirable. Thereby, the refractive index of a plastic lens can be raised more.
[0022] as a sulfhydryl group content compound, especially if compatibility with other resin ingredients or the constituent for plastic lenses is good, it will not be limited, for example, aliphatic series thiol compounds, alicycle group thiol compounds, aromatic series thiol compounds, heterocycle content thiol compounds, etc. are mentioned, and independent in these -- or you may use it, combining two or more.
[0023] Especially the thing included for either at least as a sulfhydryl group content compound in this invention among pentaerythritol tetrakis (3-mercaptopropionate), 4-mercaptomethyl -3, 6-dithio -1, and 8-octane dithiol is desirable.
[0024] Moreover, as for the resin ingredient of this invention, it is desirable as an isocyanate radical content compound that either is included at least among m-xylylene diisocyanate, 2, and 5(2 6)-bicyclo [2, 2, 1] heptane screw-(isocyanate methyl) norbornane diisocyanate methyls. when these compounds are especially combined with the above-mentioned sulfhydryl group content compound, obtaining the plastic lens from which it excels in a mechanical strength, and optical properties, such as a refractive index, hardly change with addition of an ultraviolet ray absorbent cuts.
[0025] As an ultraviolet ray absorbent used in this invention 2-(3, 5-G t-butyl-2-hydroxyphenyl)-5-chlorobenzo triazole, 2-(3-t-butyl-5-methyl-2-hydroxyphenyl)-5-chlorobenzo triazole, It is desirable that it is at least one sort chosen from the group which consists of 2-(3, 5-G t-amyl-2-hydroxyphenyl) benzotriazol and 2-(3, 5-G t-butyl-2-hydroxyphenyl) benzotriazol.

[0026] Especially each of these compounds have very good compatibility with a urethane resin ingredient, at the time of a polymerization or use of a lens, an ultraviolet ray absorbent produces bleed out, the engine performance deteriorates or there is no possibility of deteriorating. Furthermore, the effectiveness excellent in control of yellow-izing of a lens is demonstrated, giving the ultraviolet absorption ability of a plastic lens effectively.
[0027] Furthermore, the improvement effectiveness and yellow-ized depressor effect of ultraviolet absorption ability of a lens are more notably acquired by combining with the resin ingredient containing the specific sulfhydryl group content compound and isocyanate radical content compound which mentioned these ultraviolet ray absorbents above.
[0028] In this invention, as for the addition of an ultraviolet ray absorbent, it is desirable that it is 0.02 - 2.0wt% to the resin ingredient 100 weight section, and it is still more desirable. [0.4 - 2.0wt% of] Sufficient ultraviolet absorption effectiveness is not acquired with the addition of an ultraviolet ray absorbent being less than [0.02wt%], but on the other hand, if 2.0wt% is exceeded, change of optical properties, such as yellow-izing of a lens and a refractive-index fall, will be produced, and there is a possibility that the mechanical strength of a lens may fall further.

[0029] In addition, about the addition sequence of an ultraviolet ray absorbent, and especially the combination approach, it may not be limited, but you may add in one phase of the polymerization processes of a urethane resin ingredient, or may add after a polymerization.
[0030] Furthermore, it is desirable to add a bluing agent as a complementary color agent to the constituent for plastic lenses. Thereby, slight yellow-ization of the lens resulting from the color of for example, a resin ingredient or the ultraviolet ray absorbent itself is also cancelable.
[0031] As an addition of a bluing agent, 0.01-10 ppm is desirable and 0.1-1 ppm is more desirable. If there are too few additions, the dissolution of yellow-izing may not be enough, and on the other hand, when there are too many additions, there is a possibility that absorption of a bluing agent may become strong too much, and the permeability of a lens may worsen.
[0032] Especially if application into the resin ingredient containing a urethane resin ingredient is possible as a bluing agent, it will not be limited, for example, an anthraquinone system compound, a phthalocyanine system compound, a monoazo compound, a diazo compound, a triaryl methane

system compound, etc. are mentioned.
[0033] Using the above constituents for plastic lenses, it can fabricate in a predetermined configuration by the general shaping approaches, such as a cast polymerization, injection molding, and extrusion molding, and the plastic lens of this invention can be manufactured.
[0034] As for the plastic lens of this invention, it is desirable that the spectral transmittance of 400nm in 2mm thickness is 10% or less, and it is still more desirable. [5% or less of] UV-A and UV-B harmful to ultraviolet rays, especially a body tissue can be absorbed effectively by this, and it can consider as the plastic lens excellent in safety.
[0035] Moreover, as for the plastic lens of this invention, it is desirable that whenever [in 2mm thickness / yellow] (YI value) is 1.5 or less. When whenever [yellow] (YI value) exceeds 1.5, a lens may wear the yellow taste.
[0036] As for such a plastic lens, it is desirable that it is an optical lens, and as an optical lens, although lens for glasses, contact lens, Fresnel lens, rod-lens, lenticular lens, and ftheta lens etc. is mentioned, for example, especially the lens for glasses is desirable. Since a lens and a retina are protected from harmful ultraviolet rays when using as a lens for glasses, it excels [in safety] very much and is useful.
[0037] As mentioned above, although the plastic lens of this invention was explained, this invention may be the plastic lens which is not limited to these, added various kinds of additives, such as an antioxidant besides an ultraviolet ray absorbent, a pigment, a sedimentation inhibitor, a defoaming agent, an antistatic agent, and an antifogger, at the constituent for plastics if needed, for example, was manufactured.
[0038] Moreover, the plastic lens of this invention may perform chemical preparation, such as acid resisting, wear-resistant improvement, chemical-resistant improvement, surface polish, antistatic treatment, and rebound ace court processing, or physical processing according to an application etc.
[0039]
[Example] Next, the concrete example of this invention is explained.
1. The plastic lens made of urethane resin without whenever [of 2mm thickness] was produced from the constituent for plastic lenses containing the resin ingredient of the production (example 1) following of a plastic lens, an ultraviolet ray absorbent, and an additive (complementary-color agent: bluing agent).
<Resin ingredient> m-xylylene diisocyanate : 43.5wt% pentaerythritol tetrakis (3-mercaptopropionate)
: 56.5wt% <ultraviolet ray absorbent> ultraviolet ray absorbent : 0.4wt%2-(3, 5-G t-butyl-2-hydroxyphenyl) benzotriazol (lambdamax:345nm)
<Additive> bluing agent: Djibouti rutin dichloride 0.02wt% was mixed with Mitsubishi Chemical "Diaresin blue J":0.6 ppm above-mentioned resin ingredient 100wt% as a catalyst, and monomer mixed liquor was prepared. Furthermore, the above-mentioned ultraviolet ray absorbent and the bluing agent were added into this monomer mixed liquor, and it mixed so that it might become homogeneity.
[0040] Subsequently, after deaerating this mixed solution, it poured into the mold, thermal polymerization was performed, and the mold goods of a lens were obtained. Each component and a presentation are shown in Table 1.
[0041]
[Table 1]

表 1

	プラスチックレンズ用組成物		
	樹脂材料 [wt%]	紫外線吸収剤	ブルーイング剤 [ppm]
		極大吸収波長 (nm) [wt%]	
実施例 1	m-キシリレンジイソシアネート : 43.5 ペンタエリスリトールテトラキス(3-メルカプトプロピオネート) : 56.5	2-(3,5-ジ-t-ブチル-2-ヒドロキシフェニル)-ベンゾトリアゾール (345nm) : 0.4	0.6
実施例 2	m-キシリレンジイソシアネート : 51.5 4-メルカプトメチル-3,6-ジチオ-1,8-オクタンジチオール : 48.5	2-(3,5-ジ-t-ブチル-2-ヒドロキシフェニル)-ベンゾトリアゾール (345nm) : 0.4	0.6
実施例 3	m-キシリレンジイソシアネート : 43.5 ペンタエリスリトールテトラキス(3-メルカプトプロピオネート) : 56.5	2-(3,5-ジ-t-アミル-2-ヒドロキシフェニル)-ベンゾトリアゾール (346nm) : 0.4	0.6
実施例 4	m-キシリレンジイソシアネート : 51.5 4-メルカプトメチル-3,6-ジチオ-1,8-オクタンジチオール : 48.5	2-(3,5-ジ-t-アミル-2-ヒドロキシフェニル)-ベンゾトリアゾール (346nm) : 2.0	0.6
実施例 5	m-キシリレンジイソシアネート : 43.5 ペンタエリスリトールテトラキス(3-メルカプトプロピオネート) : 56.5	2-(3,5-ジ-t-ブチル-2-ヒドロキシフェニル)-5-クロロベンゾトリアゾール (351nm) : 0.01 2-(3-t-ブチル-5-メチル-2-ヒドロキシフェニル)-5-クロロベンゾトリアゾール (353nm) : 0.01	0.6
実施例 6	2,5(2,6)-ビシクロ[2,2,1]ヘプタンビス-(イソシアネートメチル)/ポリカプロラクトン イソシアネートメチル : 50.6 ペンタエリスリトールテトラキス(3-メルカプトプロピオネート) : 23.9 4-メルカプトメチル-3,6-ジチオ-1,8-オクタンジチオール : 25.5	2-(3,5-ジ-t-アミル-2-ヒドロキシフェニル)-ベンゾトリアゾール (346nm) : 0.6	0.8
比較例	ポリカーボネート樹脂粉末 : 100 (粘度平均分子量 23,700)	2-(3-t-ブチル-5-メチル-2-ヒドロキシフェニル)-5-クロロベンゾトリアゾール (353nm) : 0.02	0.6

[0042] (Example 2) The plastic lens was produced like the example 1 except having changed the resin ingredient. Each component and a presentation are shown in Table 1.
[0043] (Example 3) The plastic lens was produced like the example 1 except having changed the ultraviolet ray absorbent. Each component and a presentation are shown in Table 1.
[0044] (Example 4) The plastic lens was produced like the example 3 except having changed the addition of a resin ingredient and an ultraviolet ray absorbent. Each component and a presentation are shown in Table 1.
[0045] (Example 5) The plastic lens was produced like the example 1 except having changed a presentation and addition of an ultraviolet ray absorbent. Each component and a presentation are shown in Table 1.
[0046] (Example 6) The plastic lens was produced like the example 3 except having made the addition of a resin ingredient and an ultraviolet ray absorbent, the addition of a bluing agent, and the addition of a catalyst (Djibouti rutin dichloride) into 0.02wt(s)% to 0.05wt(s)%. Each component and a presentation are shown in Table 1.
[0047] (Example of a comparison) From the following constituent for plastic lenses, the plastic lens made of polycarbonate resin without whenever [of 2mm thickness] was produced.
<Resin ingredient> polycarbonate resin powder: : 100wt% <ultraviolet ray absorbent> ultraviolet ray absorbent : 0.02wt%2-(3-t-butyl-5-methyl-2-hydroxyphenyl)-5-chlorobenzo triazole (lambdamax:353nm)
<Additive> bluing agent: The Mitsubishi Chemical "Diaresin blue J":0.6 ppm above-mentioned polycarbonate resin powder, the ultraviolet ray absorbent, and the bluing agent were mixed, and the mold goods of a lens were obtained with injection molding. Each component and each presentation are shown in Table 1.
[0048] 2. The following performance evaluation was performed about each plastic lens produced in the performance-evaluation above-mentioned examples 1-6 and the example of a comparison of a plastic lens.
** Whenever [yellow] (YI value)
JIS It measured based on K7200. The three-stage estimated the measured value as follows. YI value is 1.5 or less. ... [... The spectral transmittance in 400nm was measured using x** ultraviolet absorption ability spectrophotometer U-3200 (Hitachi Make).] OYI value is 1.5-2.0...

**YI value is 2.0 or more.
** The refractive index of a 589.3nm D line was measured in 20 degrees C using the refractive-index Abbe refractometer. Furthermore, the refractive index of the plastic lens which added the ultraviolet ray absorbent was compared with the refractive index of each plastic lens (whenever [2mm thickness] nothing lens) produced on the same conditions except not containing an ultraviolet ray absorbent, and what O and change were regarded as in what does not have change among both was made into x.
** It consisted only of a resin ingredient used in the mechanical strength, and examples 1-6 and the example of a comparison of the plastic lens which called mechanical-strength example 1-6 and was produced in the example of a comparison, and the mechanical strength with the plastic lens (whenever [2mm thickness] nothing lens) which does not contain an ultraviolet ray absorbent was measured, and the case where change was not seen by x and the mechanical strength in the case where a mechanical strength is small, compared with the plastic lens with which the plastic lens containing an ultraviolet ray absorbent consists only of a resin ingredient be made into O. In addition, the Charpy impact test (JIS K7111) performed the comparison of a mechanical strength. These results are shown in Table 2.
[0049]
[Table 2]

表 2

	黄色度 (YI)	分光透過率 400nm(%)	屈折率	屈折率の変化	機械的強度の変化
実施例1	○	5	1．594	○	○
実施例2	○	5	1．659	○	○
実施例3	○	5	1．594	○	○
実施例4	○	5	1．659	○	○
実施例5	○	5	1．594	○	○
実施例6	○	3%以下	1．592	○	○
比較例	○	85	1．585	○	×

[0050] The plastic lens of the above result to the examples 1-6 was what causes neither yellow-izing of a lens, nor the fall of a mechanical strength, and maintains a high refractive index further, demonstrating the outstanding ultraviolet absorption ability.
[0051] On the other hand, the plastic lens of the example of a comparison is remarkably inferior to ultraviolet absorption ability, and the mechanical strength of a lens fell by addition of an ultraviolet ray absorbent further.
[0052]
[Effect of the Invention] As stated above, since it does not have yellow-ization of the lens by the ultraviolet ray absorbent and the plastic lens of this invention is maintaining the mechanical strength and the high refractive index further, demonstrating the outstanding ultraviolet absorption ability, it can be used for an application broad as optical lenses, such as a safe and highly precise lens for glasses.

[Translation done.]